

CO₂ storage potential of the Gage Sandstone, Vlaming Sub-basin, offshore southern Perth Basin: A case study based on seismic facies mapping and well log interpretation

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Geoscience Australia is conducting a study under the National Carbon Infrastructure Plan (NCIP) to assess the suitability of the Vlaming Sub-basin for CO₂ storage. It involves characterisation of the Valanginian reservoir (Gage Sandstone) and the Early Cretaceous seal (South Perth Shale) by integrating seismic interpretation and well log analysis in a detailed sequence stratigraphic investigation. The Gage Sandstone, comprised of channelised turbidites and mass flows, was the first unit deposited after breakup between India and Australia. Deposited during a sea level lowstand in the palaeo-topographic lows of the breakup unconformity, it is overlain by a thick deltaic to shallow marine succession of the South Perth Shale. The Gage Sandstone is considered one of the best reservoirs in the sub-basin with porosities of 23-30% and permeabilities of 200-1800 mD. It occurs at depths between 1000 and 3000 m below the seafloor, which is an attractive target for the injection and long-term storage of supercritical CO₂. The new extent of the Gage Sandstone, based on seismic interpretation and well log correlation, shows that in some of the wells the sandstone unit overlying the Valanginian unconformity belongs to the South Perth Shale and not to the Gage Sandstone. The *G. Mutabilis* palynological zone used in the past for identifying Gage Sandstone interval appears to be facies controlled and time transgressive. Detailed analysis of the reservoir properties at the wells in conjunction with systematic seismic facies mapping will serve as a basis for a regional reservoir model and storage potential estimation of the Gage Sandstone reservoir.